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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 C.F.R. 1.53(c)

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☒ Additional inventors are being named on the separately numbered sheet(s) attached hereto

TITLE OF THE INVENTION (500 characters max)

Water-Based Polymer System for Keratinous Substrates

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification Number of Pages [3] [] Other (specify) _____
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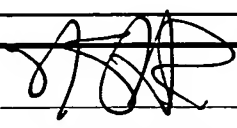
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☐ Previously Submitted.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No
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Signature		Date	11/12/04
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PROVISIONAL APPLICATION COVER SHEET
Additional Page

		Docket Number 0003.2005-000
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Water-Based Polymer System for Keratinous Substrates

The present invention relates to a urethane, acrylic, olefin graft polymer system which imparts a durable, scuff resistant coating to keratinous materials, especially as it pertains to fingernail enamels and coatings. This composition exhibits excellent water
5 and solvent resistance with drying times equivalent to conventional solvent based nail enamels. The coating is comprised of an aqueous system composed of a urethane polymer, an acrylic polymer and an olefin graft polymer. The component polymers contain ionically charged functional groups that produce ionically cross-linked films with exceptional clarity and abrasion resistance. This invention also pertains to the
10 balance of adhesive and cohesive properties obtained by the composition with improved dry time not normally found in water-based nail enamels.

The urethane of this invention is free from methyl pyrrolidone, a potential mutagen, and when combined with the water-based acrylate form a more environmentally friendly nail enamel without the damaging side effects of solvent based
15 systems. The strong urea and urethane groups form part of a substantial ionic attraction to both substrate and acrylic polymer. The acrylic polymer also contains both carboxyl and amino groups which help to interact in an association with the urethane to form a ionically bonded system approaching that of a covalently bonded system. Polymers of this composition are elucidated in United States Serial No. 60/551,658, filed March 9,
20 2004, the entire teachings of which are incorporated herein by reference. The olefin-graft polymer (United States Serial No. 60/606,985, filed September 3, 2004, the entire

teachings of which are incorporated by reference) imparts a uniform distribution of olefin throughout the film allowing even wear with improved gloss. The strong ionic interaction between the highly functional polymers impart to films of this composition a rapid set and drying.

5 Formulations of this composition can vary by polymer ratios depending on the enamels market application. Urethane percentages can range from 5% to 80%; acrylic polymer from 5% to 90%; and the olefin graft 1% to 20%. Optionally, copolymers of ethylene and/or propylene can be utilized to modify the scuff resistance. Formulations require a minimum of plasticizer and coalescent due to the ionic quick set.

10 A representative formulation of this invention can be described as follows:

		<u>Formulation Weight</u>
	Co-Solvent Free, water-based Aliphatic Urethane* @ 38%	15.75
	Bimodal Polymer @ 40%**	19.74
	Olefin-Graft polymer @ 38%***	2.0
15	Oxidized Polyethylene polymer @ 40%	1.1
	Coalescent (Optional):	
	Dibutyl Maleate	0.5
	Propylene Glycol mono methyl ether	0.9

Preliminary Test results:

		<u>Invention Disclosure</u>	<u>Solvent Enamel</u>
20	Rub Test (Ethyl Alcohol)	5	4
	Water Resistance (One hour water spot)	5	5
	Gloss	5	4.5
	Dry Time (Surface Tack with Cotton)	5	5
25	Odor	5	1
	(Test Measurement: 1 to 5; 5 the best)		

* n-Methyl Pyrrolidone (NMP) or co-solvent essentially free or free of aliphatic polyester polyurethane dispersion.

** The Acrylic Bimodal polymer is comprised of two distinct polymer chains
30 copolymerized by free-radical polymerization in a water-based system. One chain

contains anionic functionality from either methacrylic acid, acrylic acid or a combination of both. The second polymer chain contains simple amino esters of methacrylic acid or methacrylamide. The remaining monomer composition of both polymer chains is comprised of lower alkyl (C1 to C8) esters of both methacrylic and acrylic acid.

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*** The Olefin Graft polymer is a copolymer of ethylene/acrylic acid copolymer grafted in a water-based system with lower alkyl esters (C1 to C8) of both acrylic and methacrylic acid and styrene.